

# NEMA and IP Ratings

## Technical Bulletin

### Overview

The National Electrical Manufacturers Association (NEMA) has defined standards for various grades of enclosures that are rated to provide protection from environmental conditions.

A NEMA rated enclosure provides protection against environmental hazards such as water, dust, oil or coolant or atmospheres containing corrosive agents.



Similar to NEMA ratings, the IP Code, International Protection Marking, International Electrotechnical Commission (IEC) standard 60529, sometimes interpreted as Ingress Protection Marking, classifies and rates the degree of protection an enclosure provides against intrusion (body parts such as hands and fingers), dust, accidental contact, and water.

### Specifications

NEMA Rating	IP Equivalent	NEMA Definition	IP First Digit (Solid Particle Protection)	IP Second Digit (Liquid Ingress Protection)
1	IP10	Enclosures constructed for indoor use to provide a degree of protection to personnel against incidental contact with the enclosed equipment and to provide a degree of protection against falling dirt.	1 = Protected against solid foreign objects of 50mm in diameter and greater	0 = Not Protected
2	IP11	Enclosures constructed for indoor use to provide a degree of protection to personnel against incidental contact with the enclosed equipment, to provide a degree of protection against falling dirt, and to provide a degree of protection against dripping and light splashing of liquids.	1 = Protected against solid foreign objects of 50mm in diameter and greater	1 = Protected against vertically falling water drops
3	IP54	Enclosures constructed for either indoor or outdoor use to provide a degree of protection to personnel against incidental contact with the enclosed equipment; to provide a degree of protection against falling dirt, rain, sleet, snow, and windblown dust; and that will be undamaged by external formation of ice.	5 = Protected against dust - Limited to ingress (no harmful deposit)	4 = Protected against water sprayed from all directions - Limited to ingress permitted.
3R	IP14	Enclosures constructed for either indoor or outdoor use to provide a degree of protection to personnel against incidental contact with the enclosed equipment; to provide a degree of protection against falling dirt, rain, sleet, and snow; and that will be undamaged by external formation of ice.	1 = Protected against vertically falling water drops	4 = Protected against water sprayed from all directions - Limited to ingress permitted.
3S	IP54	Enclosures constructed for either indoor or outdoor use to provide a degree of protection to personnel against incidental contact with the enclosed equipment; to provide a degree of protection against falling dirt, rain, sleet, snow, and windblown dust; and in which the external mechanism(s) remain operable when ice laden.	5 = Protected against dust - Limited to ingress (no harmful deposit)	4 = Protected against water sprayed from all directions - Limited to ingress permitted.

### Specifications (Continued)

NEMA Rating	IP Equivalent	NEMA Definition	IP First Digit (Solid Particle Protection)	IP Second Digit (Liquid Ingress Protection)
<b>4</b>	<b>IP66</b>	Enclosures constructed for either indoor or outdoor use to provide a degree of protection to personnel against incidental contact with the enclosed equipment; to provide a degree of protection against falling dirt, rain, sleet, snow, windblown dust, splashing water, and hose-directed water; and that will be undamaged by the external formation of ice.	6 = Totally protected against dust	6 = Protected against strong jets of water from all directions - Limited to ingress permitted.
<b>4X</b>	<b>IP66</b>	Enclosures constructed for either indoor or outdoor use to provide a degree of protection to personnel against incidental contact with the enclosed equipment; to provide a degree of protection against falling dirt, rain, sleet, snow, windblown dust, splashing water, hose-directed water, and corrosion; and that will be undamaged by the external formation of ice.	6 = Totally protected against dust	6 = Protected against strong jets of water from all directions - Limited to ingress permitted.
<b>5</b>	<b>IP52</b>	Enclosures constructed for indoor use to provide a degree of protection to personnel against incidental contact with the enclosed equipment; to provide a degree of protection against falling dirt; against settling airborne dust, lint, and fibers; and to provide a degree of protection against dripping and light splashing of liquids.	5 = Protected against dust - Limited to ingress (no harmful deposit)	2 = Protected against direct sprays of water up to 15° from the vertical.
<b>6</b>	<b>IP67</b>	Enclosures constructed for either indoor or outdoor use to provide a degree of protection to personnel against incidental contact with the enclosed equipment; to provide a degree of protection against falling dirt; against hose-directed water and the entry of water during occasional temporary submersion at a limited depth; and that will be undamaged by the external formation of ice.	6 = Totally protected against dust	7 = Protected against the effects of temporary immersion between 15cm and 1m. Duration of test 30 minutes.
<b>6P</b>	<b>IP67</b>	Enclosures constructed for either indoor or outdoor use to provide a degree of protection to the personnel against incidental contact with the enclosed equipment; to provide a degree of protection against falling dirt; against hose-directed water and the entry of water during prolonged submersion at a limited depth; and that will be undamaged by the external formation of ice.	6 = Totally protected against dust	7 = Protected against the effects of temporary immersion between 15cm and 1m. Duration of test 30 minutes.
<b>12 &amp; 12K</b>	<b>IP52</b>	Enclosures constructed (without knockouts) for indoor use to provide a degree of protection to personnel against incidental contact with the enclosed equipment; to provide a degree of protection against falling dirt; against circulating dust, lint, and fibers; and against dripping and light splashing of liquids.	5 = Protected against dust - Limited to ingress (no harmful deposit)	2 = Protected against direct sprays of water up to 15° from the vertical.
<b>13</b>	<b>IP54</b>	Enclosures constructed for indoor use to provide a degree of protection to personnel against incidental contact with the enclosed equipment; to provide a degree of protection against falling dirt; against circulating dust, lint, and fibers; and against the spraying, splashing, and seepage of water, oil, and noncorrosive coolants.	5 = Protected against dust - Limited to ingress (no harmful deposit)	4 = Protected against water sprayed from all directions - Limited to ingress permitted.